

USEPA SF



1432441

# Swan Island Basin Fate and Transport Analysis

Presentation to EPA

09/19/2013

# Introduction



**COAST & HARBOR  
ENGINEERING**



**CONFLUENCE**  
ENVIRONMENTAL COMPANY

**PgG**

- Introductions
- Purpose and goals
- Meeting overview

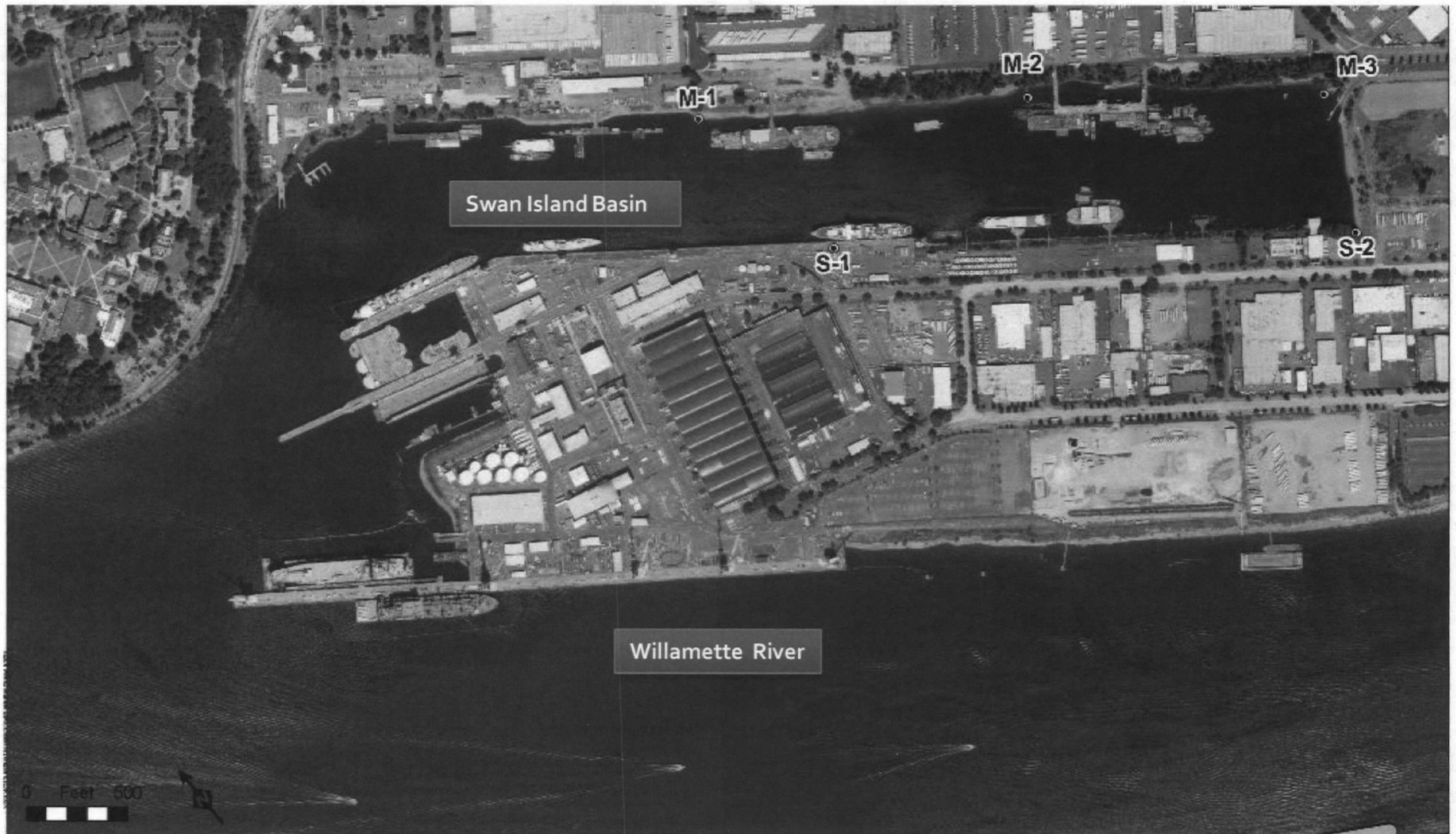
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# Process Background

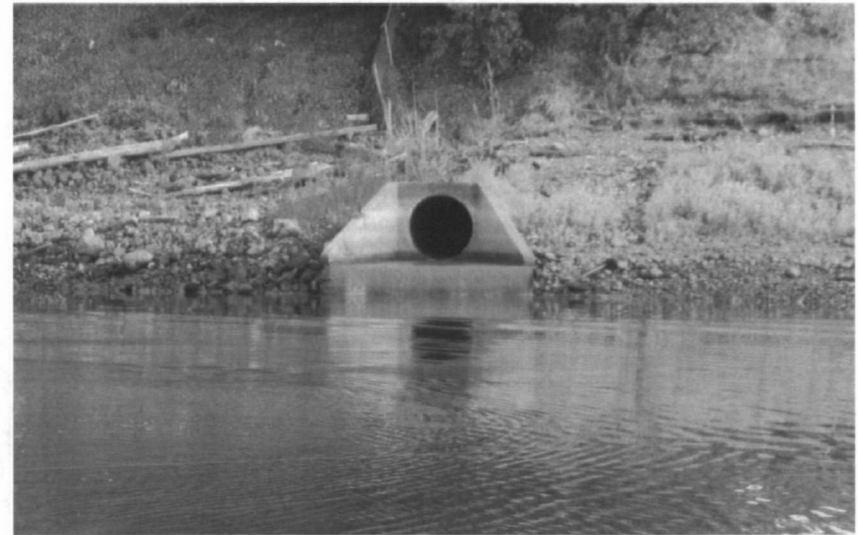
- Existing data and analysis
- Preliminary study using simple model
- Fine-resolution fate and transport analysis focused on SIB

# SIB Vicinity Map



# Key Questions

- What is the contribution of stormwater, and associated stormwater solids, discharged from each of the five COP outfalls to the SIB?
- Where have the stormwater solids from each of the five COP outfalls come to be located within the SIB?



## Key Questions, cont.

- What is the relative contribution of Contaminants from the five COP outfalls, as compared to the contribution of Contaminants from other sources, to the SIB?
- Are the stormwater solids contributed by the five COP outfalls contained within the SIB or do they enter the main stem of the Willamette River?

# Presentation Overview

- Context: previous analysis, study area
- Modeling approach
- Model results: City of Portland M-1 outfall
- M-1 outfall key findings
- Model results: Basin-wide
- SIB key findings

# LWG Modeling

- Hydrodynamic and sediment transport modeling using EFDC
- Coarse grid resolution over long time periods (years) and large river reach (miles)
- Applied to remedy evaluation and assessing effectiveness of long-term natural recovery

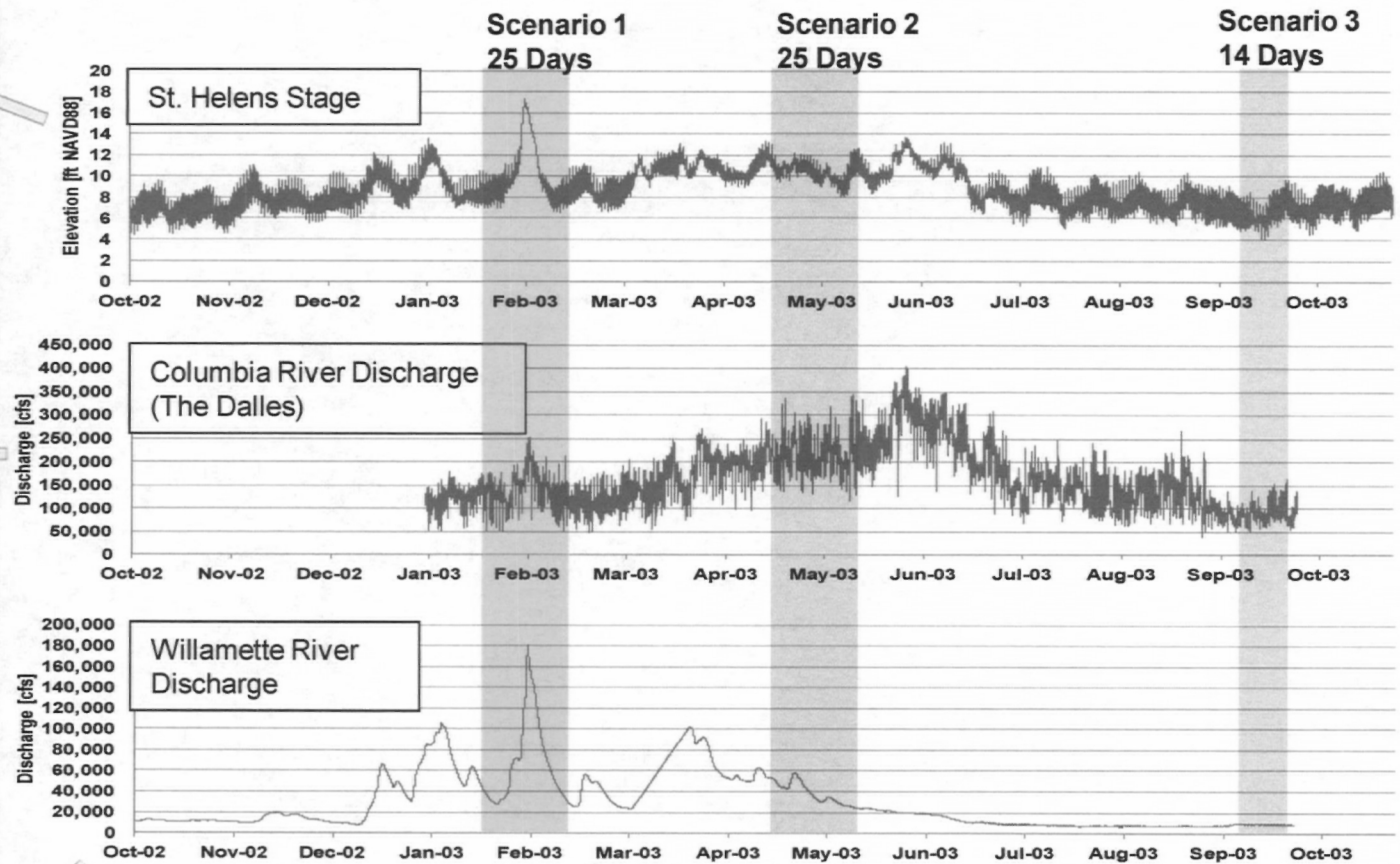
# Comparison of Modeling Efforts

- New modeling supplements LWG work
- Near-field (fine resolution) analysis focuses on areas within the SIB
- SIB is a quiescent backwater – distinct from the high velocity dynamic environment in the main river channel
- Fine resolution model more accurately represents the processes unique to the quiescent backwater conditions in SIB

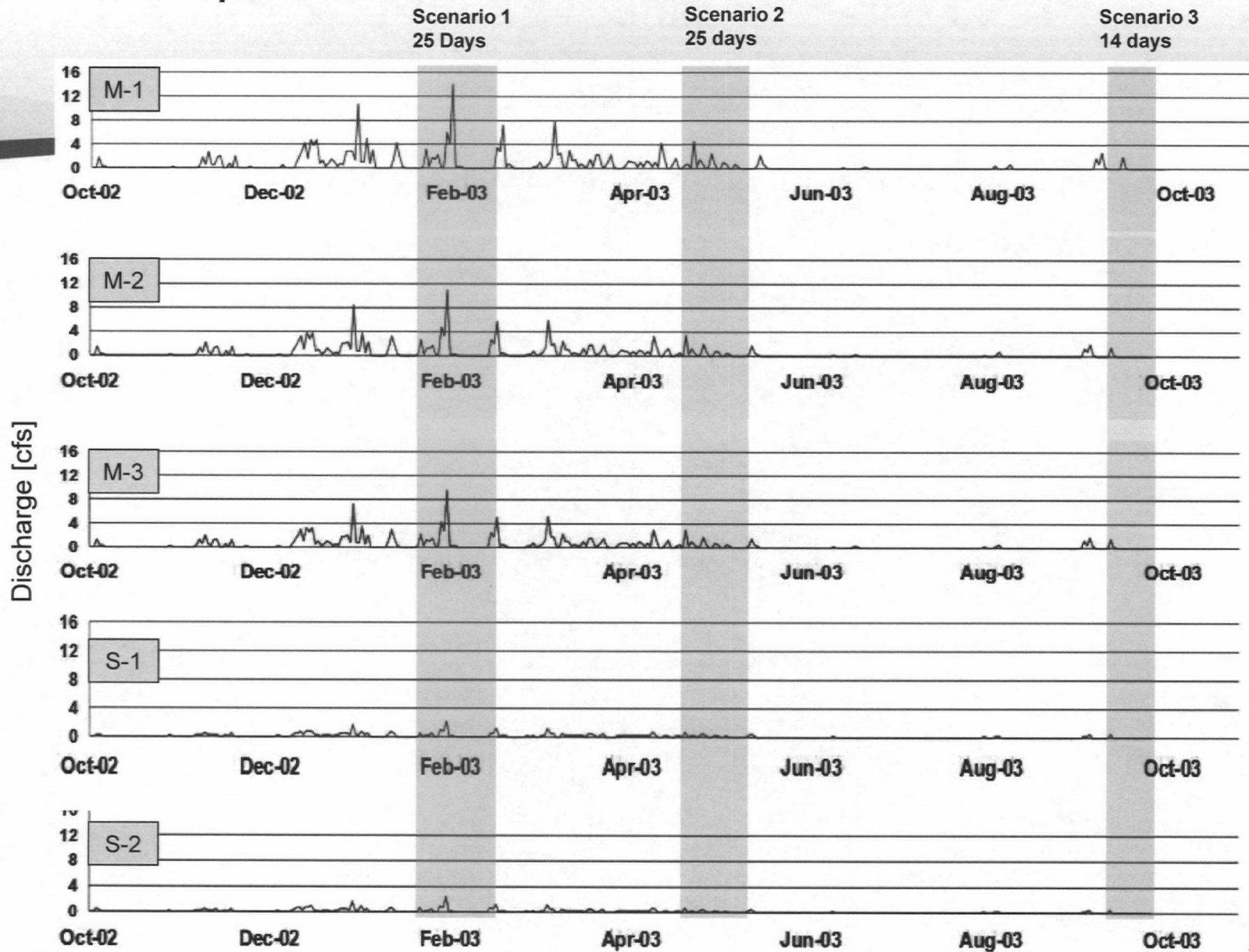
# Data for Modeling Effort

- Bathymetry
- River flow volumes
- Water surface elevations
- Outfall flow volumes
- Sediment characteristics

# Hydrologic Data



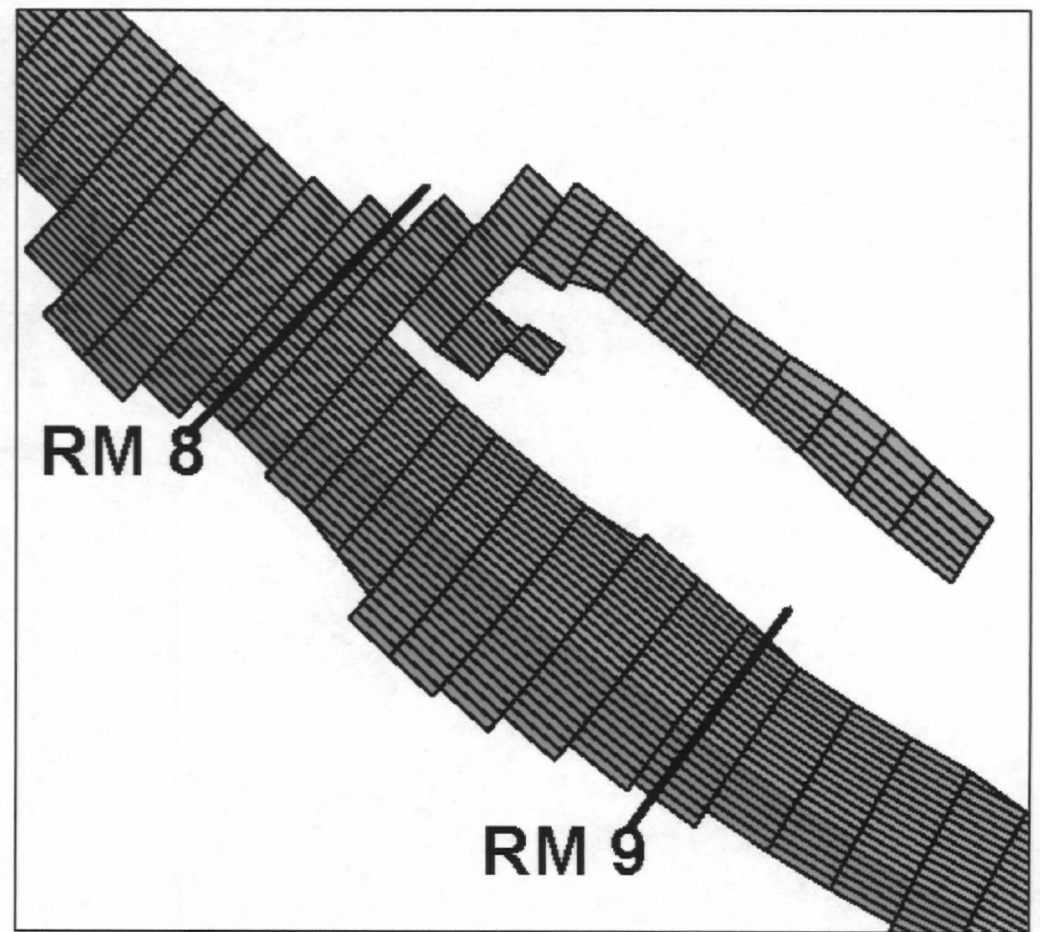
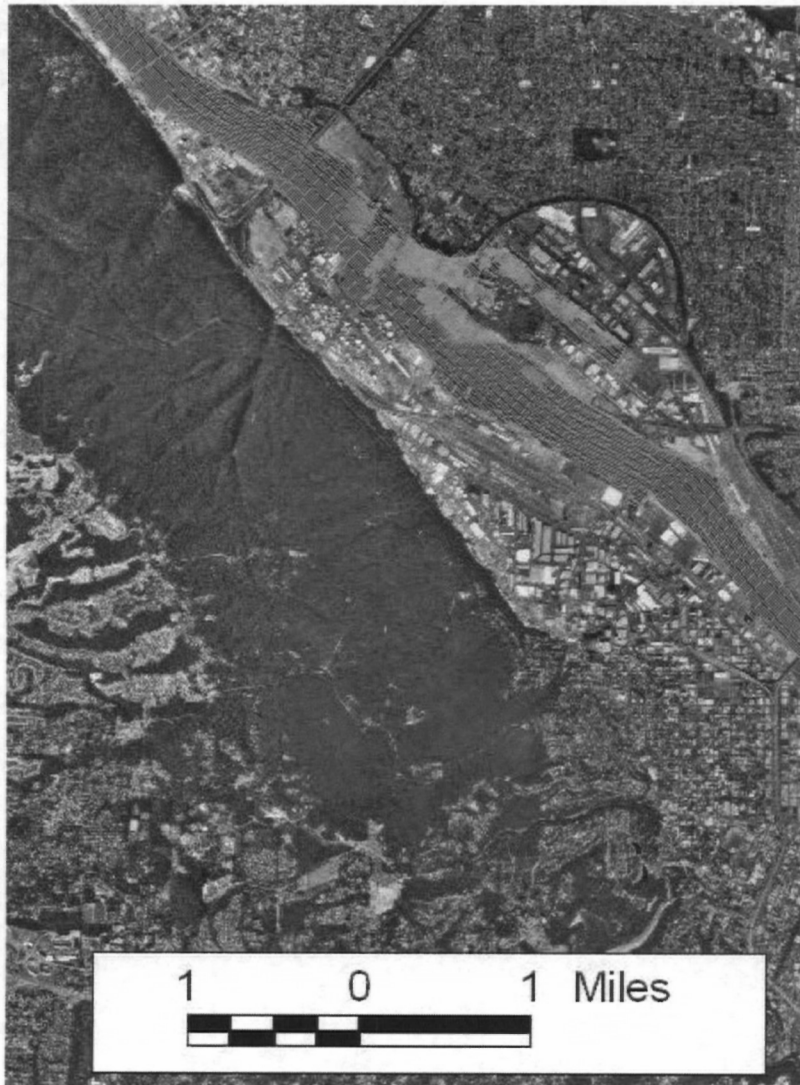
# Outfall Input Data



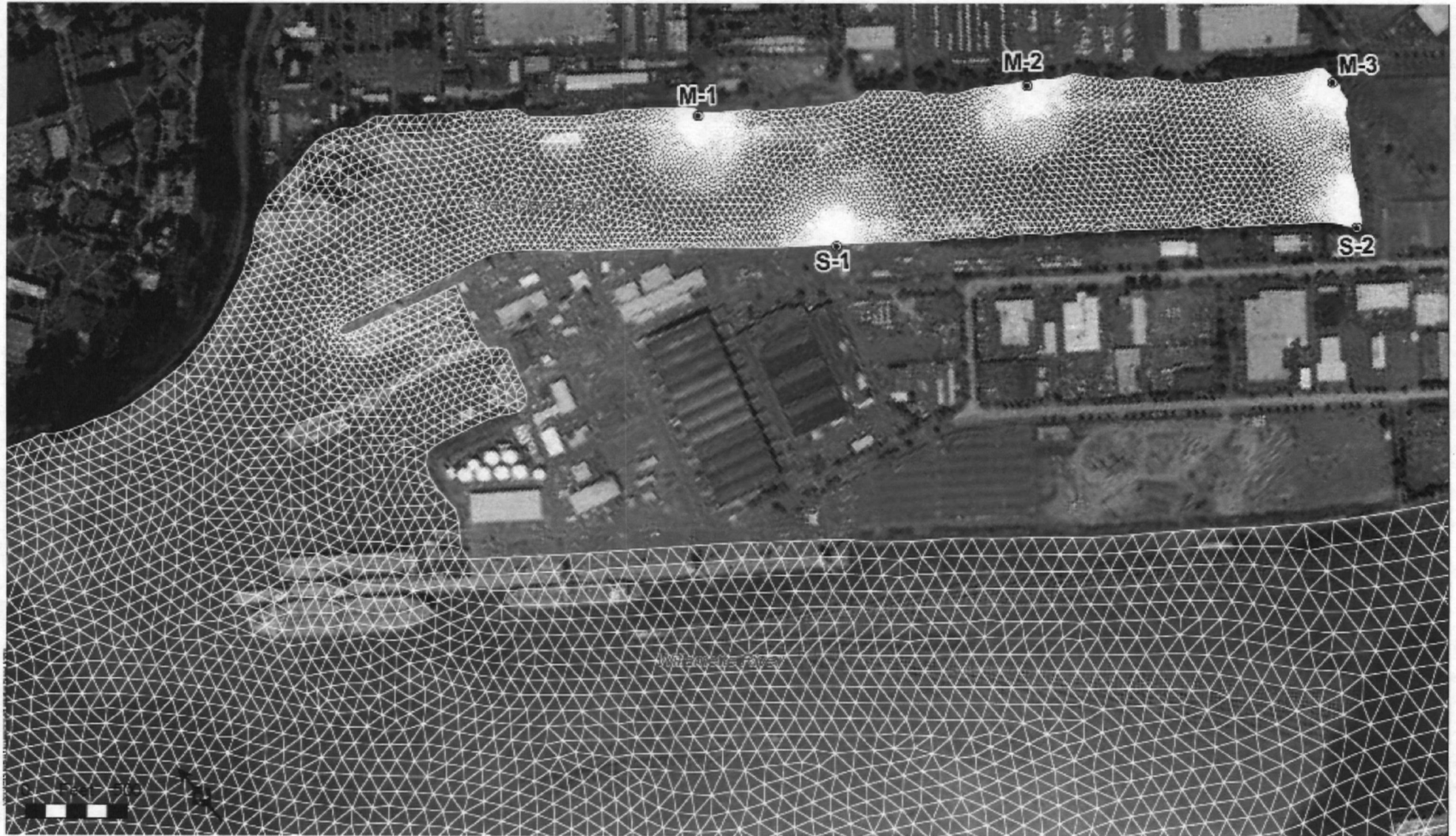
# Bathymetry



# EFDC Model Grid



# SELFE Model Grid



# Modeling Scenarios

Scenario	Description	Dates	Willamette River - Maximum Flow (cfs) <sup>1</sup>	Outfall – Maximum Flow (M-1) (cfs)	Outfall Sediment Concentrations (mg/L) <sup>2</sup>	Maximum Daily Rainfall (inch/day)
<b>1</b>	High flow	1/18/03 – 2/12/03	181,000	14.0	120	2.05
<b>2</b>	Medium flow	4/14/03 – 5/9/03	63,000	4.5	40	0.65
<b>3</b>	Low flow	9/5/03 – 9/19/03	9,800	2.6	20	0.38

1. WEST and Integral 2006. 2. COP 2010 Stormwater Evaluation Report; the same TSS values were applied to all outfalls

# Outfall Contribution: Methodology

**Purpose:** Quantify the relative Contaminant contribution to SIB sediments from COP outfalls.

- Define outfall footprints by mapping where 99% of particles settle for each outfall in each model scenario.
- Calculate Contaminant mass in 99% outfall footprint relative to total mass in the SIB, using Natural Neighbor interpolation and Draft RI and Draft FS databases.

# Outfall Contribution: Methodology

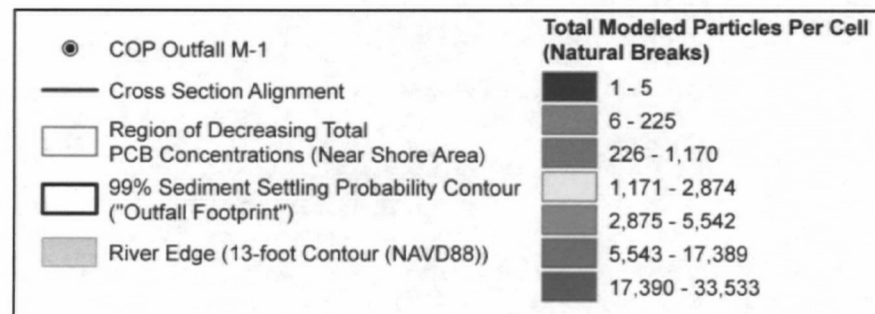
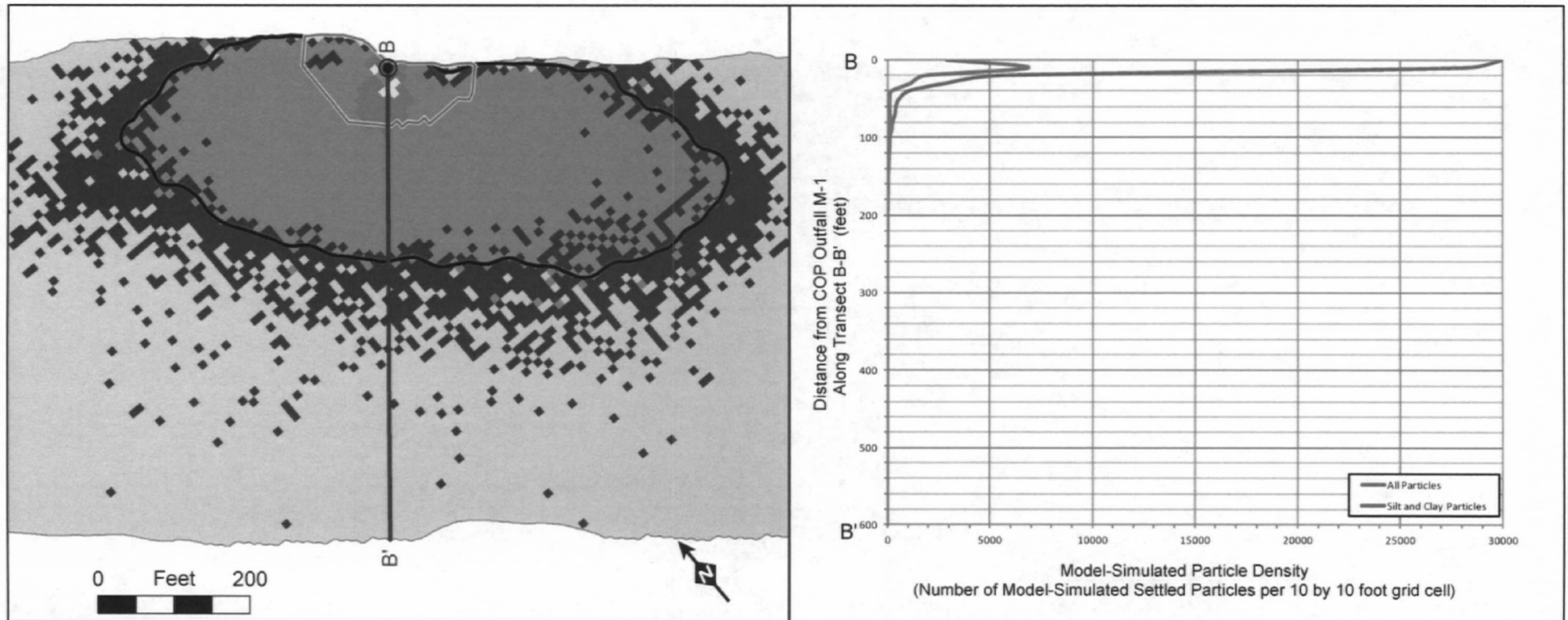
## **Five Hydrophobic Contaminants**

- PCBs
- BaPeq (PAHs)
- sum-DDE
- Copper
- Lead

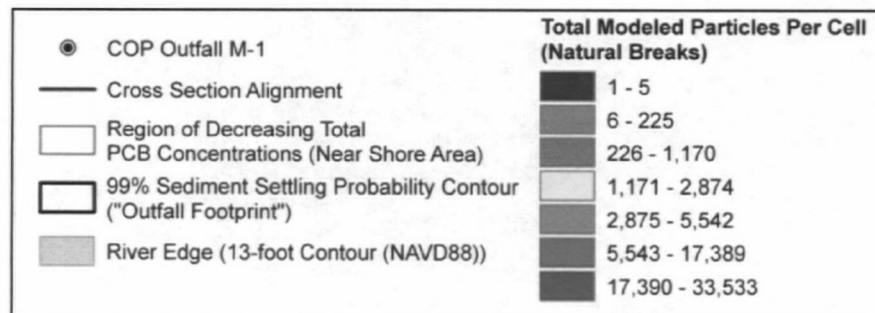
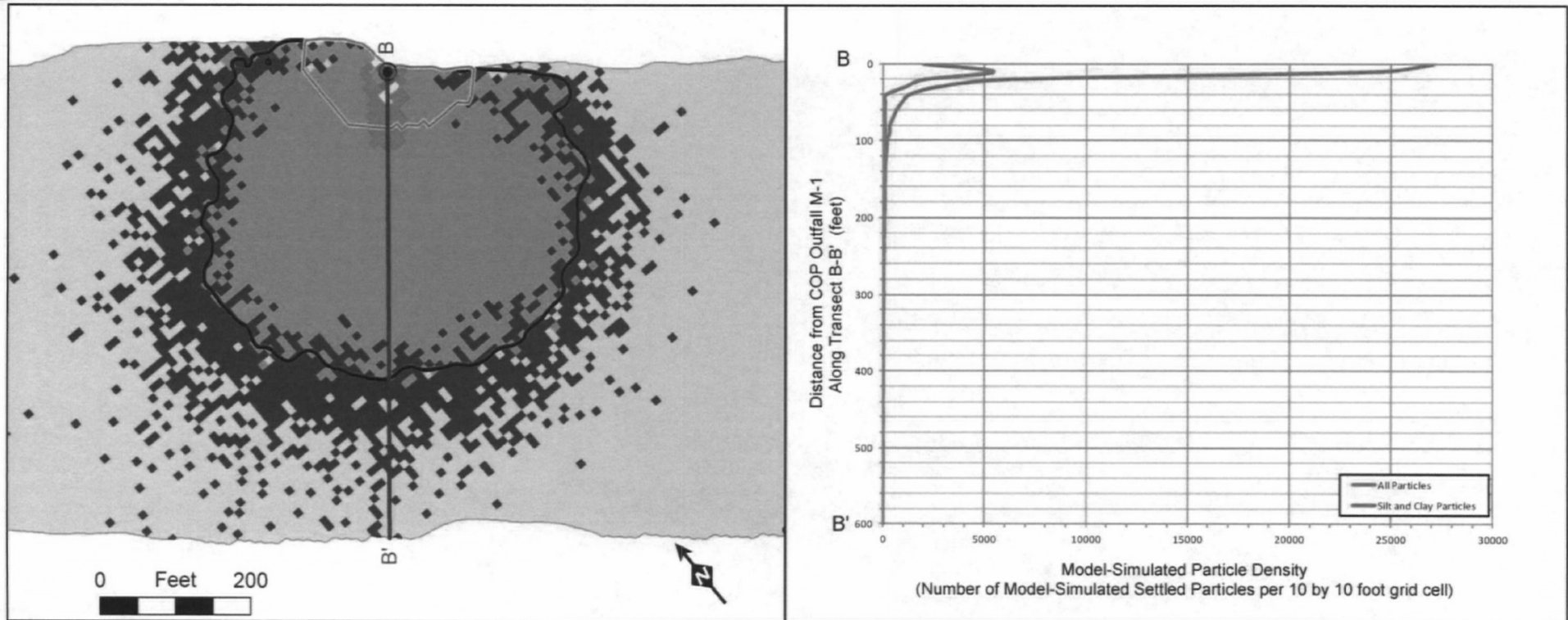
## **Rationale**

- All are Draft FS Bounding COCs
- PCBs, BaPeq, sum-DDE, and Benthic Toxicity
- For Benthic Toxicity, used Copper and Lead

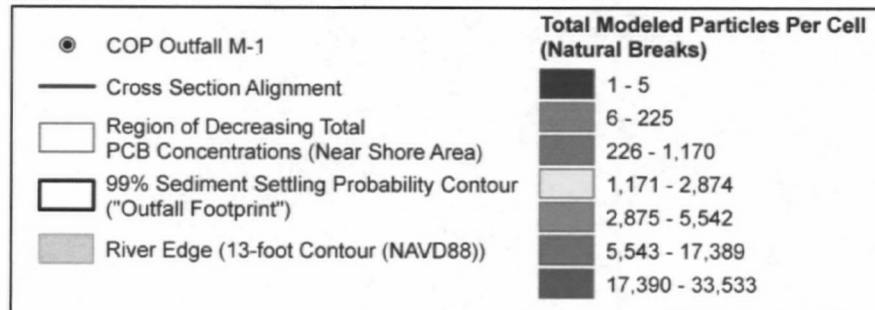
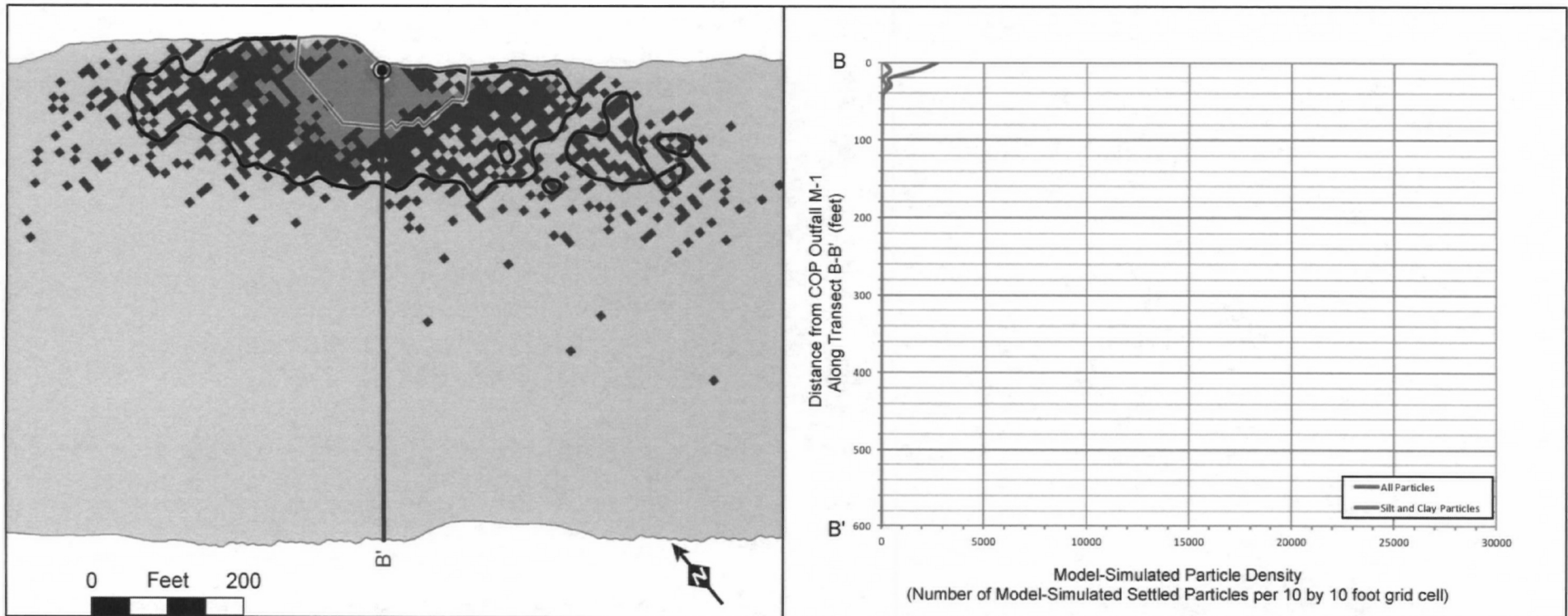
# M-1 Contribution: Scenario 1



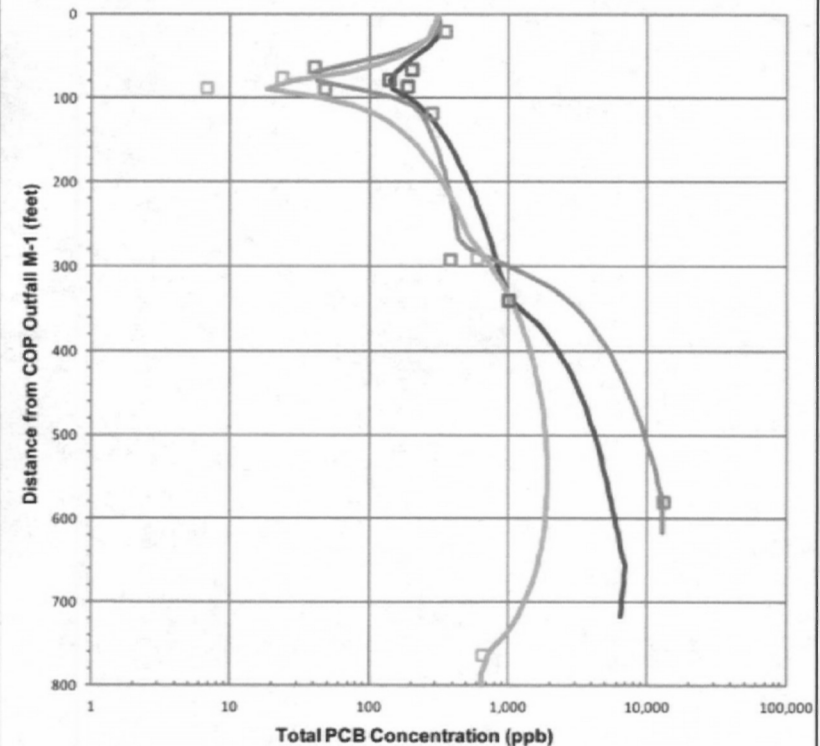
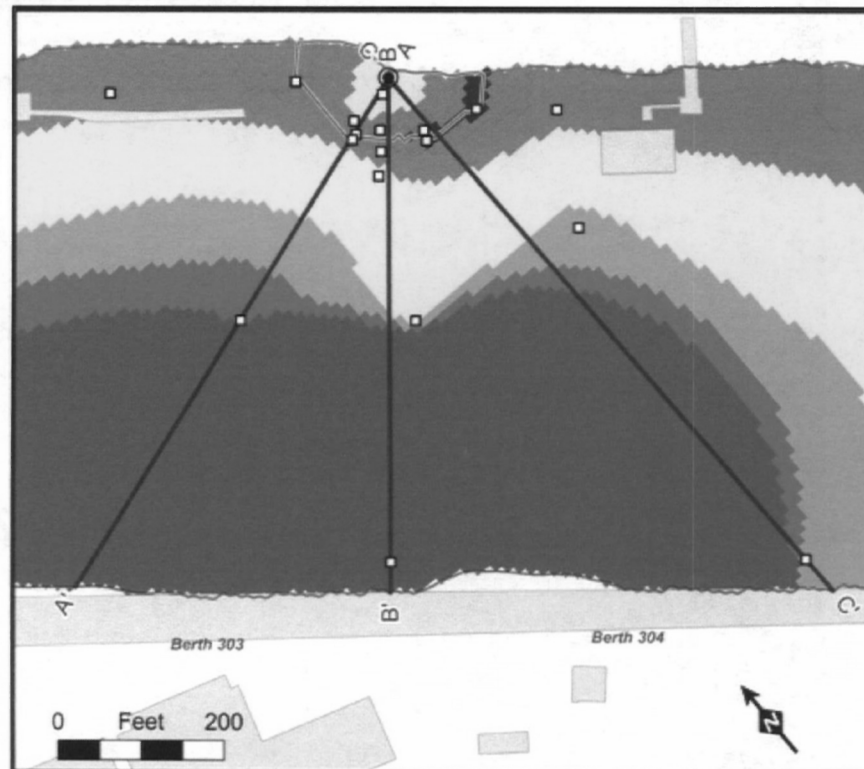
# M-1 Contribution: Scenario 2



# M-1 Contribution: Scenario 3



# M-1 Results: M-1 Contribution



- COP Outfall M-1
- Surface Sediment Sample Locations Used in Interpolation (Total PCBs)
- Cross Section Alignments
- Region of Decreasing Total PCB Concentrations (Near Shore Area)
- River Edge (13ft Contour (NAVD88))
- Docks and Structures

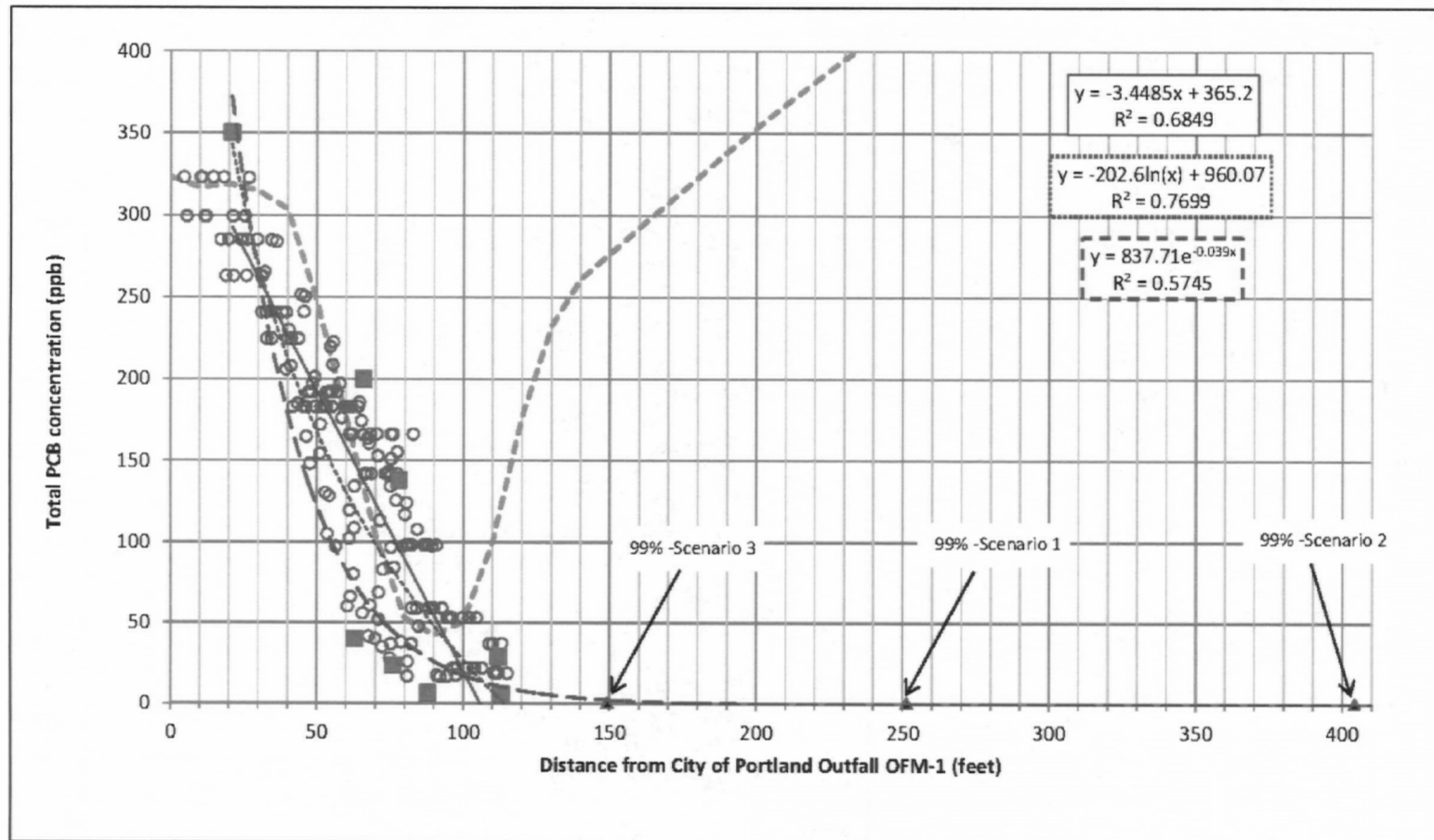
Notes:  
 1) Data Source:  
 Draft Feasibility Study Sediment Database  
 (2012 Portland Harbor Draft Feasibility Study,  
 Appendix R.)  
 2) Sample Depths <= 40 cm

## Total PCBs (ug/kg)

- <= 29.5
- 29.6 - 75
- 75.1 - 200
- 200.1 - 500
- 500.1 - 750
- 750.1 - 1,000
- > 1,000.0

- Surface Sediment Samples (A-A')
- Surface Sediment Samples (B-B')
- Surface Sediment Samples (C-C')
- Natural Neighbors Interpolation (A-A')
- Natural Neighbors Interpolation (B-B')
- Natural Neighbors Interpolation (C-C')

# M-1 Results: M-1 Contribution

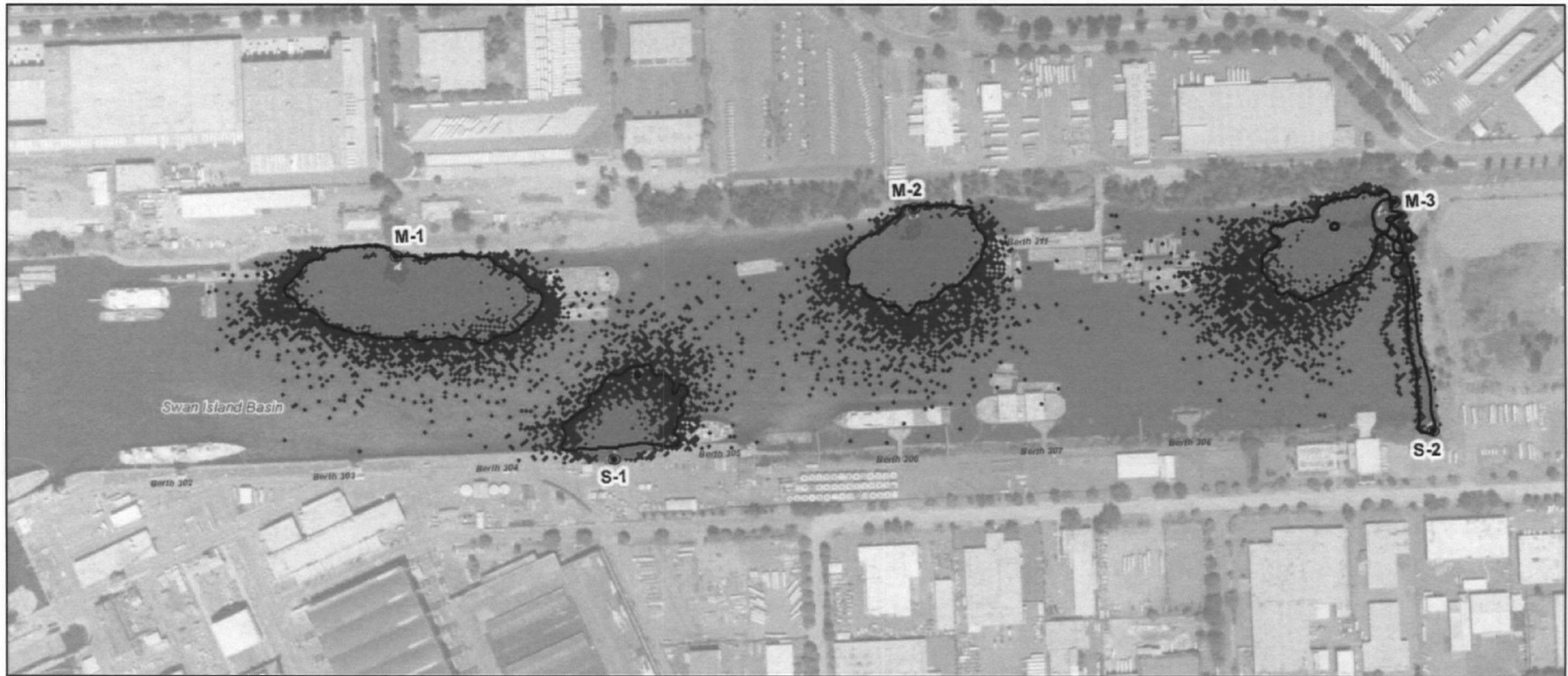


- Total PCB Concentration from Natural Neighbor Interpolation along Transect B-B'
- Total PCB Concentration, Natural Neighbor Interpolation
- Total PCB Concentration, Surface Sediment Samples within Near Shore Area (From Portland Harbor Draft FS Database)
- ▲ 99% Outfall Footprints along Transect B-B'

# Key Findings for M-1 Outfall

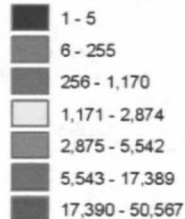
- The M-1 outfall contributes stormwater and associated stormwater solids to the SIB in predictable varying quantities.
- Stormwater solids from the M-1 outfall are deposited within sediment in close proximity to the outfall.
- Including non-outfall sources, the depositional footprint at each of the five outfalls contains less than 5% of each Contaminant present in SIB sediments.
- Excluding non-outfall sources, the depositional footprint at M-1 decreased to much less than 1% for PCBs. Similarly, other Contaminants mass percents would decrease at other outfalls if we excluded non-outfall sources.
- All (100%) of the stormwater solids contributed by the M-1 outfall are deposited within the SIB sediments and remain there.

# Overall SIB Results: Scenario 1



● COP Stormwater Outfall

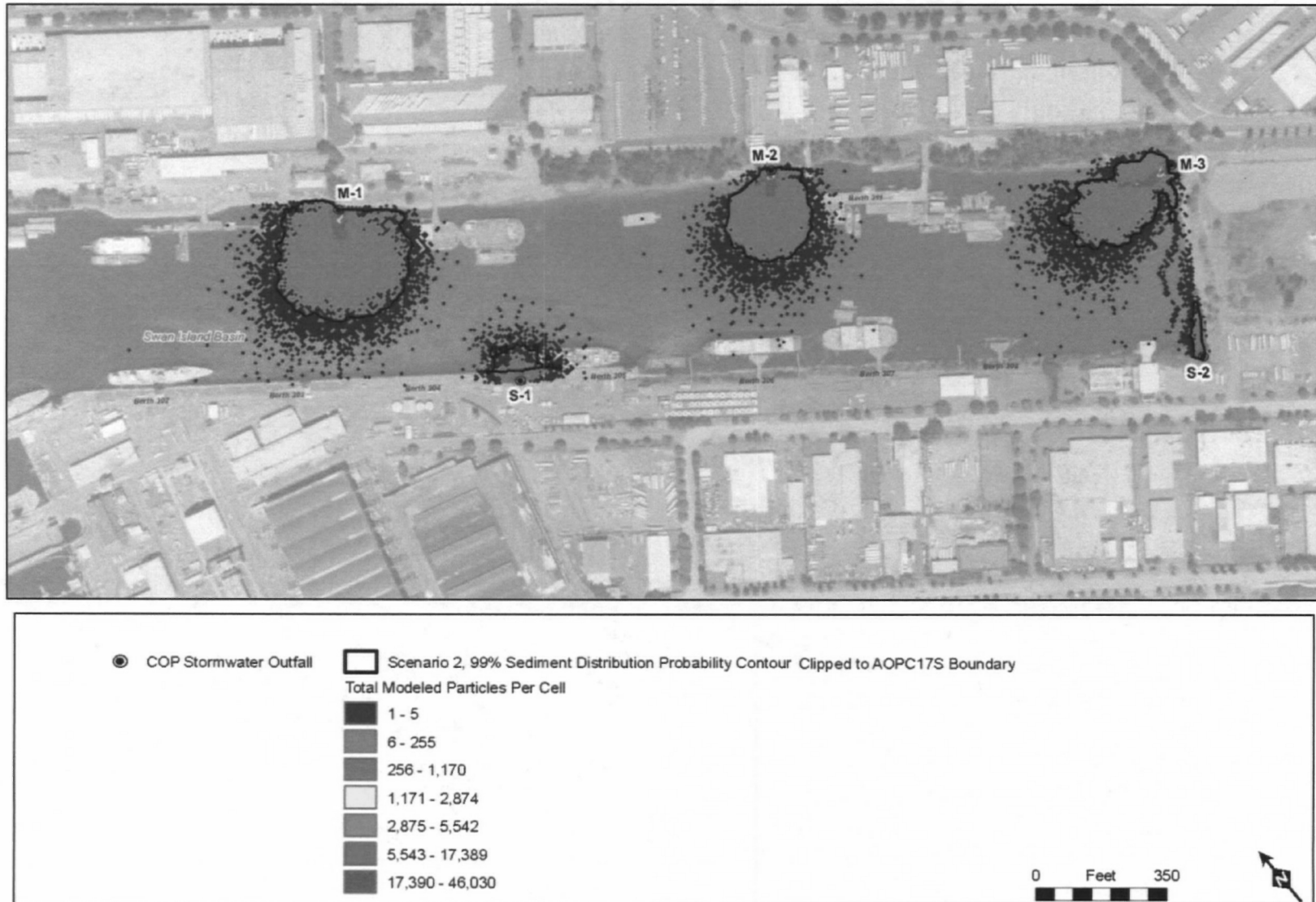
Scenario 1, 99% Sediment Distribution Probability Contour Clipped to AOPC17S Boundary  
Total Modeled Particles Per Cell



0 Feet 350



# Overall SIB Results: Scenario 2



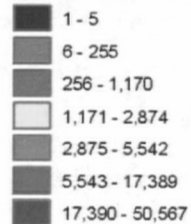
# Overall SIB Results: Scenario 3



● COP Stormwater Outfall

□ Scenario 3, 99% Sediment Distribution Probability Contour Clipped to AOPC17S Boundary

Total Modeled Particles Per Cell



0 Feet 350



# Conclusions

- The five COP outfalls contribute stormwater and associated stormwater solids to the SIB in predictable varying quantities.
- Stormwater solids from each of the five COP outfalls are deposited within sediment in close proximity to each outfall.
- Each of the five COP outfalls contributes less than 1 percent (1 %) of the Contaminants observed in SIB sediments.
- Other sources not related to the five COP outfalls contribute over 99 percent (99%) of Contaminants in the SIB.
- All (100%) of the stormwater solids contributed by the five COP outfalls are deposited within the SIB sediments and none of the stormwater solids from the five COP outfalls enters the main stem of the Willamette River.

# Why EPA Should Incorporate the SIB F-T Analysis into the PH Site Admin Record

- Builds a stronger foundation for EPA decision making
- Addresses significant data gaps in the RI and FS process
- Enhances the quality of the conceptual site model for the SIB

# GIS Artifacts in SIB Concentration Natural Neighbor Mapping

- It appears that the Draft FS interpolated across land masses (Swan Island and curves in the river).
- These artifacts incorrectly increase the AOPC 17S SWAC for PCBs by approximately 91 ppb.
- We respectfully ask that GIS Artifacts be corrected.

# Inconsistency in SWAC-SIB Boundary

- The SWAC-SIB area is 50% smaller than other SWAC areas, twice as conservative spatially.
- The SWAC-SIB area is truncated, does not include lower concentration areas from AOPC 17S.
- The truncated SWAC-SIB more than doubles the PCB SWAC-SIB to 670 ppb.
- Corrected, the AOPC 17S SWAC is 323 ppb PCBs, yet AOPC 17S is small relative to other SWACs.
- We respectfully ask that comparable SWACs be used site-wide.

# Recommendations and Path Forward

- That EPA utilize the new data in the SIB F-T Analysis to fill data gaps and augment its administrative record to further support informed decision-making with regard to remedy selection at the PH Site
- That the DTNA Consultant Team is available to answer any questions that EPA may have now, or in the future, about this presentation or the technical work performed to support their conclusions as set out in the SIB F-T Analysis

Thank You

**Questions?**

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